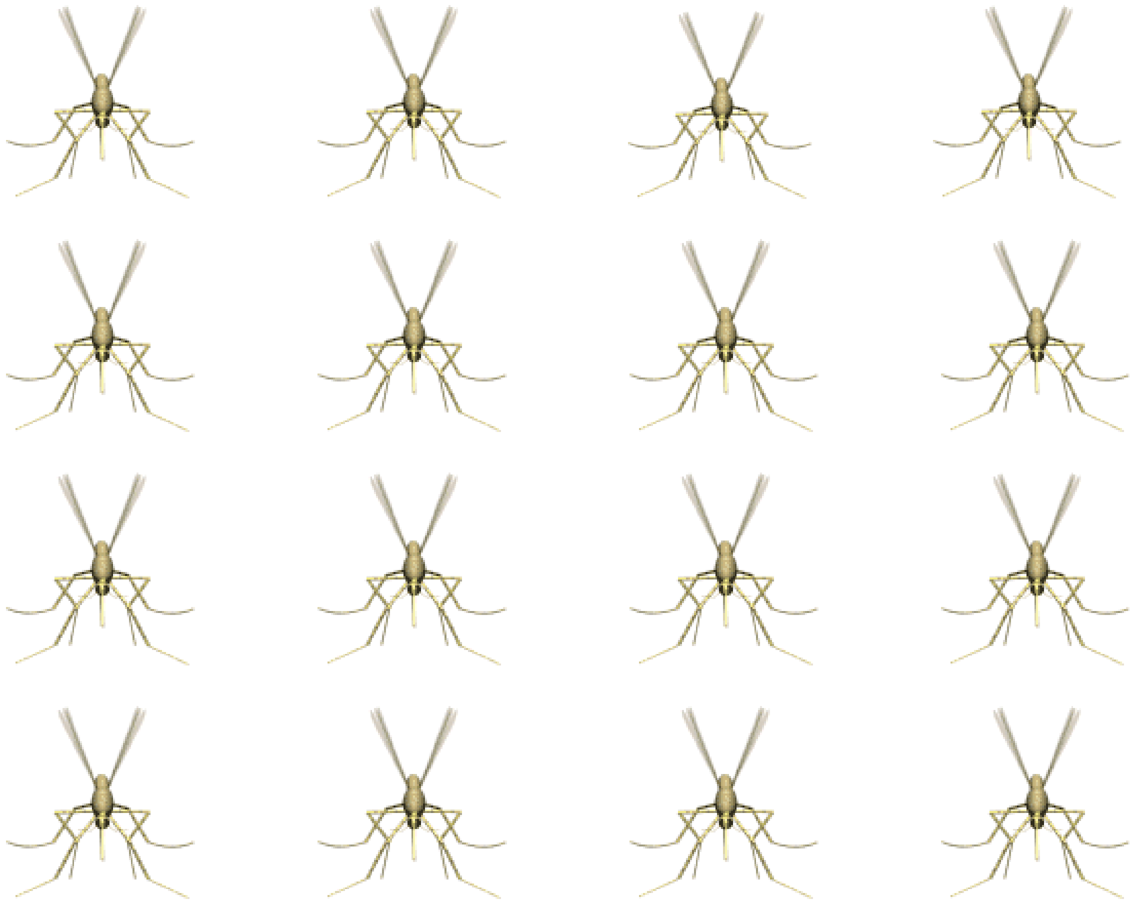
2012
North Dakota
Mosquito Surveillance Program



NORTH DAKOTA
DEPARTMENT of HEALTH

Division
of
Laboratory Services

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2012 North Dakota Mosquito Surveillance Program's Mission

Through mosquito collection and speciation, the North Dakota Department of Health (NDDoH) monitors the risk of infection from arboviral encephalitides that are known to occur in this region. The North Dakota Mosquito Surveillance team focuses activities on *Culex tarsalis*, monitoring for increased numbers in the New Jersey mosquito trap network and viral identification using the CDC miniature light mosquito trap network. Should mosquito populations reach significant levels or arbovirus activity is detected, appropriate recommendations for mosquito population control will be issued by the NDDoH to the vector control districts.

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North Dakota Mosquito Surveillance Program Background

Since 1975, the North Dakota Department of Health has monitored the mosquito populations throughout the state. The Mosquito Surveillance Program traditionally has been activated following arboviral outbreaks or flooding incidences in various locations statewide.

The program was first initiated in 1975 following an outbreak of western equine encephalitis (WEE) and St. Louis encephalitis (SLE) in the United States. In 1977, the program was officially formed under the title *North Dakota Arboviral Encephalitis Surveillance Program* and housed with the Division of Environmental Sanitation and Food Protection. This program was responsible for equine and human arbovirus surveillance until 1989.

The program was reinstated under the name *North Dakota Mosquito Surveillance Program* in 1994 in response to flooding of the Red River in 1993. This program was operated by the Division of Microbiology until 1997.

In 2000, the *North Dakota Mosquito Surveillance Program* was reinstated in response to the 1999 West Nile virus (WNV) outbreak in New York. In 2002, North Dakota had its first confirmed human cases of WNV, as well as detectable virus through laboratory testing in birds, horses and mosquitoes.

The 2003 program was expanded from 50 New Jersey mosquito traps to a network of 87 traps and 18 CDC miniature light mosquito traps. These enhancements provided network coverage statewide. The 2004 program further expanded the trap network to include 94 New Jersey mosquito traps and 33 CDC miniature light mosquito traps. A video also was produced to aid in trap placement training.

The 2005 program was further expanded to 103 New Jersey mosquito traps and 39 CDC miniature light mosquito traps. The program for 2006 had 100 New Jersey traps in operation, with at least one in each county. The dry conditions during the 2006 season kept the mosquito numbers low when compared to other seasons, and it was decided to postpone any live trapping.

In 2007, there were 97 New Jersey traps in use. In July, live trapping was initiated at nine locations in Grand Forks, at two locations on the grounds of the laboratory, and at one location set up by the city of Bismarck due to increased Culex tarsalis numbers in the state. Four out of 17 pools collected at the laboratory tested positive for West Nile virus. All 14 pools collected by the city of Grand Forks and the five pools collected by the city of Bismarck were negative. In 2008, trappers across the state maintained a New Jersey light trap network of 92 traps. Live trapping was not implemented in 2008 by the Division of Laboratory Services - Microbiology.

In 2009, there were 91 total New Jersey light traps in operation. Live trapping was not implemented. For the 2010 season, there were 92 traps in operation. With the spread of West Nile virus continuing westward and proving it is established in our state, funding for many programs is being limited and we will discontinue live trapping. The New Jersey light trap portion of the program will not be affected.
In 2012, the program ran unchanged from 2010 and 2011.

Information about West Nile virus in North Dakota is available at www.ndhealth.gov/wnv.

New Jersey Mosquito Trap Network

The New Jersey mosquito trap network monitors mosquito populations throughout the state. By identifying mosquito populations known to be competent encephalitis vectors, the information from the network is used to determine the threat of mosquito-borne encephalitis in various regions of the state.

Thank you to the following New Jersey mosquito trap operators whose dedication and commitment to the North Dakota Department of Health Mosquito Surveillance Program made the 2012 program a success!

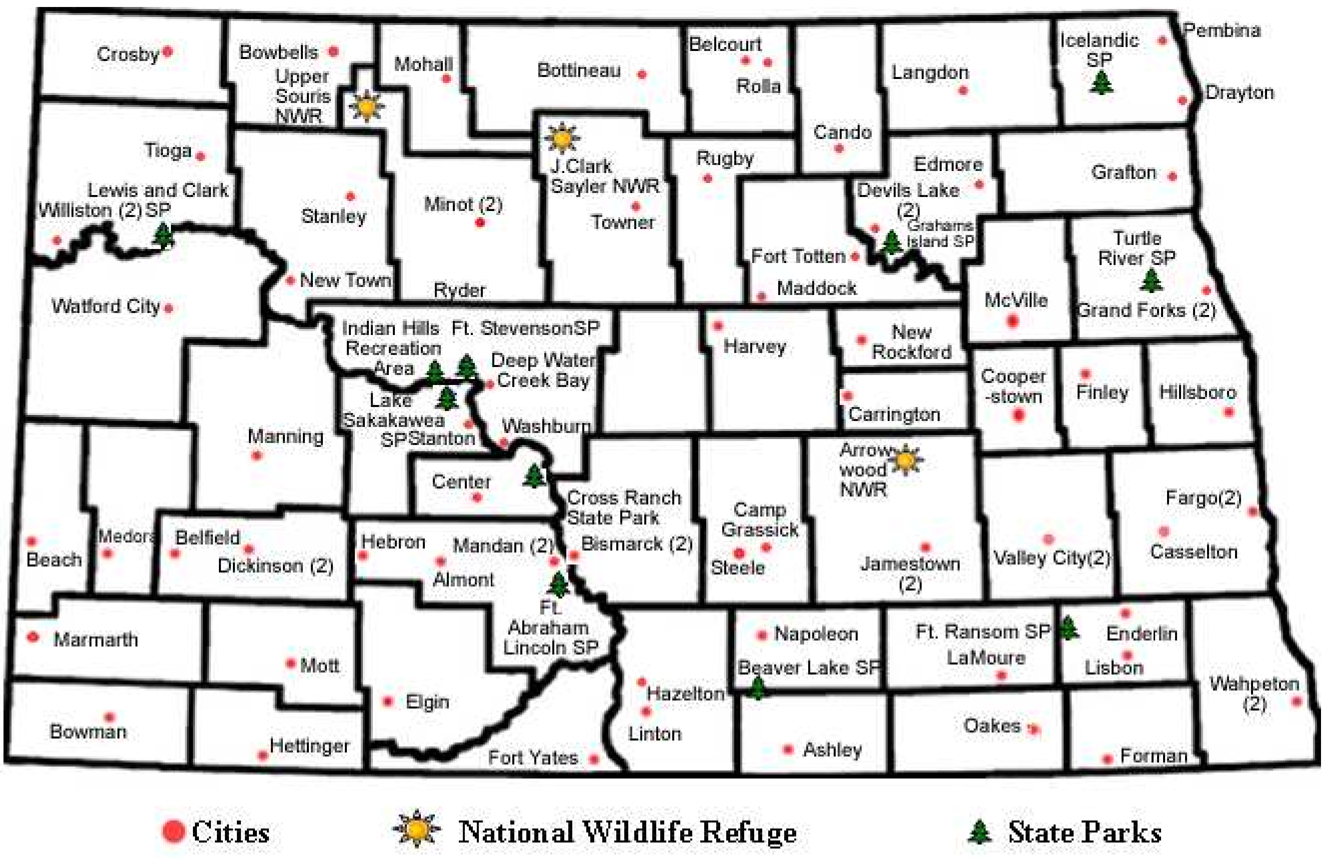
*Indicates State Park   ** Indicates National Wildlife Refuge

Location	Trapper	Location	Trapper	Location	Trapper
Arrowwood**	Paulette Scherr	Cross Ranch*	Eric Lang	Fort Yates	Jeanette Cluett
Beach	Kim Nunberg	Deep Water Creek Bay	Kerry Hartman	Ft. Abraham Lincoln*	Dan Schelske
Beaver Lake*	James Loken	Devils Lake	Leroy Axdahl Myron Asleson	Grafton	Mike Huska
Beulah	Vern Muscha	Dickinson	Denny Smith	Grahams Island*	Henry Duray
Bismarck	Anton Sattler	Dickinson A	Bridget Lewis	Grand Forks	Todd Hanson
Bottineau	Keith Fulsebakke	Drayton	Nick Rutherford	Harvey	Jay Stolz
Bowbells	Petter Willyard	Elgin	Norman Schock	Hazelton	Bev Voller
Bowman	Andrea Bowman	Edmore	David Levang	Hazen	Keith Johnson
Dawson	Dan Mimnaugh	Enderlin	Rick Gillund	Hebron	Jim Raaf & Lance Elmer
Cando	Casey Edblad	Fargo	Ben Prather	Hettinger	Julie Kramlich
Carrington	Shaunette Koenig	Finley	Brittany Ness	Hillsboro	Jim Anderson
Casselton	Camille Paaverud	Forman	Colleen Sundquist	Icelandic*	Justin Robinson
Center	Janell Peterson	Fort Ransom*	John Kwapinski	Indian Hills Recreational Area*	Kelly Sorge
Cooperstown	Farrah Saxberg	Fort Stevenson*	Richard Messerly	J.Clark Sayler **	Frank Durbian
Crosby	Dennis Lampert	Fort Totten	Hilda Garcia	Jamestown	Judy Huisenga

Mosquito Trap Network Continued:

Location	Trapper	Location	Trapper	Location	Trapper
Lake Metigoshe*	Larry Hagen	Minot	Lisa Otto	Tioga	Kirk Odegard
Lake Sakakawea*	Keith Orth	Mohall	Tammy Aberle	Towner	Jeffrey Smette
Lamoure	Tony Hanson	Mott	Kim Kibbel	Turtle River*	Joseph Allen
Langdon	Rob Gilseth	Napoleon	Sheldon Gerhardt	Upper Souris**	Thomas Pabian
Lewis & Clark*	Greg Corcoran	New Rockford	George Ritzke	Valley City	Jeff Differding
Lisbon	Randy Seelig	Oakes	Robert Schaefer	Wahpeton	Randy Nelson
Maddock	Frank Mosser	Oak Park, Minot	Jim Heckman	Washburn	Sandy Birst
Mandan	Aaron Johnson	Pembina	Nancy Thompson	Watford City	Bob Nelson
Manning	Kevin Pavlish	Rolla	Scott Hanson	Williston	Dan Saint
Marmarth	Joni Sonsalla	Rugby	Deb Schiff		
McVille	Ryan Johnson	Ryder	Jody Reinsch		
Medora	Emily Nelson	Stanley	Jim Hennessy		

2011 New Jersey Mosquito Trap Surveillance Sites & Regions



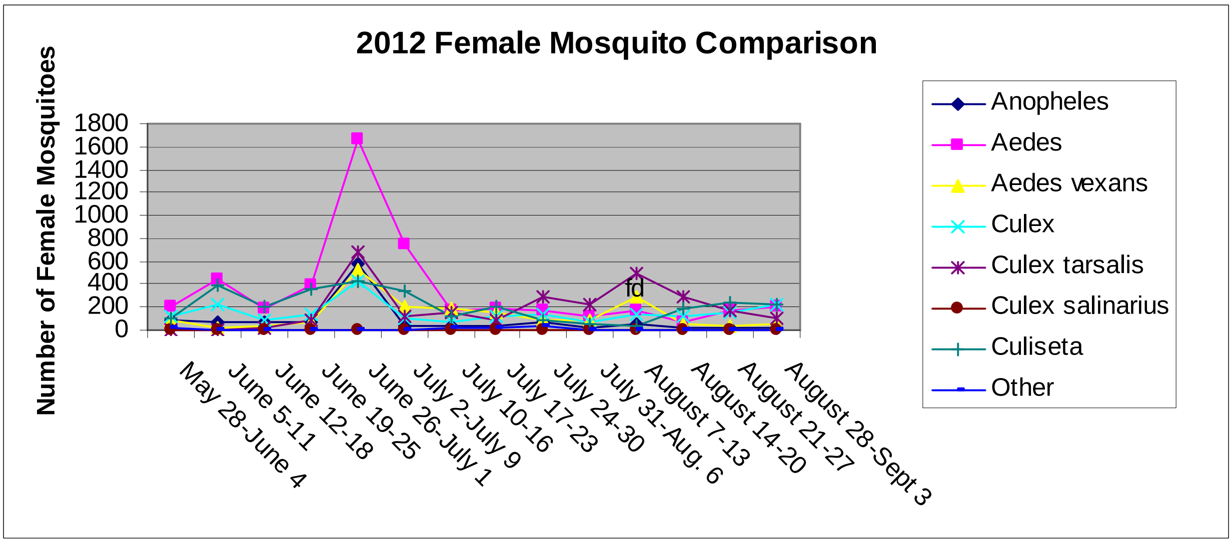
New Jersey Mosquito Trap Network Information

In 2012, the New Jersey mosquito trap network had a total of 92 traps across North Dakota. There were 12 in state parks and three in national wildlife refuges. Two New Jersey mosquito traps were located in each urban area with a population greater than 5,000 citizens.

At the beginning of the mosquito trapping season, usually Memorial Day, the New Jersey mosquito trap operator installs a trap in a suitable location. Using a programmable timer, the trap is set to operate from dusk to dawn seven nights a week. At the end of the seven-day period, the trap contents are collected and sent to the North Dakota Department of Health, Division of Laboratory Services - Microbiology in Bismarck for counting and speciation. This process is repeated weekly until Labor Day.

At the Division of Laboratory Services - Microbiology, mosquito surveillance personnel sort the mosquitoes by sex and genera. Since male mosquitoes do not bite, they are of little health concern. However, their numbers are monitored because male mosquitoes hatch first, and increased numbers may indicate a future female mosquito population boom. The female mosquitoes are separated into four genera: *Anopheles*, *Aedes*, *Culex* and *Culiseta*. These genera are then enumerated.

- *Anopheles* is associated with malaria and West Nile virus.
- *Aedes* is associated with illnesses such as canine heartworm, LaCrosse encephalitis (LCE), eastern equine encephalitis (EEE), western equine encephalitis (WEE), California encephalitis (CAE), and West Nile virus (WNV). Although *Aedes vexans* has been shown to be capable of laboratory transmission of WNV, its mammalian feeding preferences decrease its potential as an enzootic vector for WNV.
- *Culex* is the mosquito of greatest public health concern in North Dakota, since all species are competent vectors of SLE, WEE and WNV. The species most commonly associated with encephalitis in North Dakota is *Culex tarsalis*, a principal arbovirus vector in rural agricultural ecosystems.
- *Culisetas* are monitored due to its association with eastern equine encephalitis.



2012 New Jersey Mosquito Trap Count Totals by Week - Counties

Week of	Male	Female									Total mosquitoes	% Trap sites submitted
		Anopheles	Aedes	Aedes vexans	Culex	Culex tarsalis	Culex salinarius	Culiseta	Other	Total female		
May 28-June 4	59	86	178	81	93	0	0	78	16	532	591	40.3
June 5-11	318	57	270	16	133	2	0	266	0	744	1,062	46.8
June 12-18	90	64	188	27	86	22	0	199	0	586	676	66.2
June 19-25	694	76	378	71	141	76	0	353	0	1,095	1,789	59.7
June 26-July 2	2,264	582	1,663	513	415	671	0	410	0	4,254	6,518	64.9
July 3-July 9	270	38	741	207	96	122	0	342	0	1,545	1,825	63.6
July 10-16	405	35	153	179	60	141	1	103	24	696	1,101	70.1
July 17-23	409	30	182	151	110	76	5	177	11	740	1,149	64.9
July 24-30	426	71	162	85	120	280	1	87	33	839	1,265	71.4
July 31-Aug. 6	247	13	111	76	65	21	0	45	0	528	775	63.6
August 7-13	260	42	167	285	134	500	1	40	4	1,173	1,433	66.2
August 14-20	312	13	70	44	110	280	0	174	1	692	1,004	68.8
August 21-27	379	10	165	29	150	170	0	231	0	755	1,134	61.0
Aug. 28-Sept.3	163	9	168	58	212	94	0	199	3	743	906	50.6
2012 Totals	**6,296**	**1,126**	**4,596**	**1,822**	**1,925**	**2,455**	**8**	**2,704**	**92**	**14,922**	**21,228**	

2012 New Jersey Mosquito Trap Count Totals by Week - State Parks

Week of	Male	Female									Total mosquitoes	% Trap sites submitted
		Anopheles	Aedes	Aedes vexans	Culex	Culex tarsalis	Culex salinarius	Culiseta	Other	Total female		
May 28-June 4	0	0	5	0	8	0	0	0	0	13	13	41.7
June 5-11	220	0	176	0	89	2	0	118	0	385	605	58.3
June 12-18	7	1	2	0	0	0	0	0	0	3	10	41.7
June 19-25	6	0	11	0	1	4	0	9	0	25	31	58.3
June 26-July 2	7	0	7	1	9	10	0	9	0	36	43	75.0
July 3-July 9	0	0	3	0	0	0	0	2	0	5	5	50.0
July 10-16	11	0	14	0	3	6	0	12	0	35	46	58.3
July 17-23	9	4	2	0	9	6	0	33	0	54	63	75.0
July 24-30	20	4	12	0	8	2	0	6	0	32	52	75.0
July 31-Aug 6	21	2	5	5	6	8	0	0	0	26	47	66.7
August 7-13	1	0	0	0	1	0	0	0	0	1	2	33.3
August 14-20	6	3	2	0	4	5	0	6	0	20	26	66.7
August 21-27	3	0	2	0	2	0	0	2	0	6	9	50.0
Sept.3	8	2	39	0	10	4	0	21	0	76	84	50.0
2012 Totals	**319**	**16**	**280**	**6**	**150**	**47**	**0**	**218**	**0**	**717**	**1,036**	

2012 New Jersey Mosquito Trap Count Totals by Week - National Wildlife Refuges												
		Female										
Week of	Male	Anopheles	Aedes	Aedes vexans	Culex	Culex tarsalis	Culex salinarius	Culiseta	Other	Total female	Total mosquitoes	% Trap sites submitted
May 28-June 4	4	0	24	0	24	0	0	24	0	72	76	66.7
June 5-11	42	16	4	0	6	0	0	4	0	30	72	66.7
June 12-18	9	0	3	0	0	0	0	0	0	3	12	66.7
June 19-25	0	0	0	0	0	0	0	0	0	0	0	66.7
June 26-July 2	5	0	0	4	0	0	0	0	0	4	9	66.7
July 3-July 9	8	0	6	2	0	0	0	4	0	0	20	66.7
July 10-16	0	0	0	0	0	0	0	0	0	0	0	66.7
July 17-23	0	1	2	1	0	1	0	0	0	0	5	66.7
July 24-30	0	0	0	0	0	0	0	0	0	0	0	66.7
July 31-Aug.6	0	1	0	0	1	1	0	0	0	3	3	66.7
August 7-13	0	1	0	0	0	0	0	0	0	1	1	66.7
August 14-20	0	0	0	0	0	0	0	1	0	1	1	66.7
August 21-27	1	0	1	0	2	1	0	1	0	5	6	66.7
Sept.3	0	0	1	0	0	0	0	0	0	1	1	33.3
2012 Totals	**69**	**19**	**41**	**7**	**33**	**3**	**0**	**34**	**0**	**120**	**206**	

Arbovirus Information

More than 2,500 different species of mosquitoes are found worldwide, with about 200 species in the United States and at least 43 of these in North Dakota. The most common vector in the spread of arboviruses is the mosquito; however, not all mosquitoes are vectors in the transmission of arboviruses.

Male mosquitoes feed almost exclusively on nectar and therefore do not bite. Female mosquitoes lay eggs that require a blood meal and bite animals, warm- or cold-blooded, and birds. Stimuli that influence biting include a combination of carbon dioxide, temperature, moisture, smell, color and movement. Humans are seldom the first or second choice for a blood meal. Horses, cattle, smaller mammals and birds are preferred. Although acquiring a blood meal is essential for female egg production, both male and female mosquitoes are mainly nectar feeders.

Mosquito-borne diseases cause more than one million human deaths every year. Some of these diseases include protozoan infections such as malaria; filarial pathogens such as canine heartworm; and viruses that cause dengue, yellow fever and encephalitis.

Arthropod-borne viruses (arboviruses) are the most diverse and serious diseases transmitted to susceptible vertebrate hosts by mosquitoes. All arboviral encephalitides are zoonotic involving a nonhuman primary vertebrate and a primary arthropod vector. Humans and domestic animals can develop clinical illness but usually are “dead-end” hosts because they do not contribute to the transmission cycle.

West Nile virus (WNV) is the most recently emerged arbovirus in North America. West Nile virus is named after the West Nile region of Uganda where it was first discovered in 1937. *Culex* species of mosquitoes are the primary vectors. Common in many parts of the world, WNV had not been seen in the United States until late summer 1999, when it made its debut in New York. WNV then proceeded to travel westward across the continent the following year. West Nile fever can be characterized by fever, headache and rash to more serious symptoms. Although only a small percentage of people infected with WNV display symptoms, WNV can cause encephalitis (an inflammation of the brain) and meningitis (inflammation of the brain and spinal cord) in humans and animals.

Western equine encephalitis (WEE) is mostly found in states west of the Mississippi River. The primary vector is *Culex tarsalis.* Birds are the most important host. Since 1964, there have been fewer than 1,000 cases reported. Human mortality rates are about 5 percent, with horse mortality rates considerably higher.

Eastern equine encephalitis (EEE) is spread to horses and humans by infected mosquitoes. Annually, there are a small number of cases nationwide. EEE is the most serious of the arboviruses that can affect the central nervous system (CNS), resulting in severe complications and even death. Symptoms may range from none at all to flu-like to more serious infections with sudden fever and severe headache followed by seizures and coma. About half of patients die, and of those who survive, many suffer permanent CNS damage.

St. Louis encephalitis (SLE) is transmitted from birds to mammals by an infected mosquito. SLE was discovered in 1933 in St. Louis, Mo. Since then, SLE has been reported in 46 states. Most infections of SLE do not result in illness, with mild cases exhibiting aseptic meningitis or fever. The elderly and very young children are more susceptible, with fatality rates from 2 percent to 20 percent and neurologic dysfunction occurring in about 1 percent of survivors.

The California serogroup is a group of several related viruses that included California encephalitis, La Crosse encephalitis, and Jamestown Canyon virus. Each year, about 75 cases are reported in the United States, with the majority of the illnesses resulting from La Crosse encephalitis. The California serogroup viruses primarily affect male children younger than 16. Infections are mild, with a mortality rate of about four deaths per 1,000 infections.

North Dakota Mosquito Surveillance Risk Assessment Chart for Arbovirus Activity

Risk Category	Probability of Human Outbreak	Definition of Conditions	Recommended Response by Mosquito Surveillance Team and North Dakota Vector Control Personnel
1a	Remote	Mid-season; first week of July; no observed epizootic activity; low population counts of vector species from New Jersey trap network	Begin preliminary, low-intensity CDC live-trapping network and testing in all areas of the state; test for targeted virus presence.
1b		Late-season; third week of July through September; no observed epizootic activity; high population counts from New Jersey trap network	Deploy mid-intensity CDC live-trapping network and viral testing in areas with high population counts of targeted vector species; continue low intensity trapping and testing in other areas.
2	Low	Sporadic epizootic activity in birds or mosquitoes	Deploy high intensity CDC live-trapping network and viral testing in epizootic areas, and consider preliminary control measures such as source reduction and larval control; continue surveillance in other areas.
3	Moderate	Initial confirmation of virus in horse or human; moderate activity in birds or mosquitoes	Continue as in Category 2; consider adult mosquito-control as indicated by surveillance activity.
4	High	Measures suggesting high risk of human infection (for example, high dead bird densities, high mosquito infection rates, multiple positive mosquito species, horse or mammal cases indicating escalating epizootic transmission, or a human case)	Response as in Category 3; initiate adult mosquito control program in areas of potential human risk.
5	Outbreak in progress	Multiple confirmed human cases; conditions as listed in Category 4	Implement emergency adult mosquito-control program; if widespread, consider aerial spraying.

Appendix A
New Jersey Mosquito Trap Data Analysis

The mosquito's life cycle has four separate and distinct stages: egg, larva, pupa and adult. A female mosquito breeds in the presence of water and lays fertile eggs after obtaining a blood meal. The location in which a female mosquito deposits her eggs in the environment depends upon larval habitat preference. The 43 mosquito species indigenous to North Dakota can be grouped into four categories that reflect their larval habitat preference. These categories include the permanent pool group, the transient water group, the floodwater group, and the artificial container and tree-hole group.

Mosquitoes within the **permanent pool group**, *Anopheles* and *Culex* species, lay eggs either singly or side by side on the water surface of permanent ponds and lakes. Permanent pool mosquitoes can develop continuously in warm water and hatch daily into adults. **Transient water mosquitoes,** such as *Culex tarsalis*, prefer to lay their eggs in pools of a temporary nature. Common habitats of the transient water group are roadside ditches, canals, ground pools and irrigated lands. Transient water mosquito eggs in ditches and small depressions must wait until rainfall to begin the hatching process. **Floodwater mosquitoes**, the *Aedes* species, lay eggs singly on damp soil or along vegetated shorelines; the eggs remain dormant until these areas are flooded. Once flooded, the eggs hatch if conditions are favorable. Large numbers of larvae emerge, and adults can appear as early as six days after flooding. A major rainstorm, a series of showers, or irrigation sufficient enough to produce standing water promotes hatching in the floodwater species of mosquitoes. The **artificial container and tree-hole group of mosquitoes** place their eggs inside the wall of a container or depression inside a tree, at or above the water line, and the eggs hatch when the water levels rise. A heavy rain resulting in standing water in old tires, tin cans and flowerpots will begin the hatching process for artificial container mosquitoes.

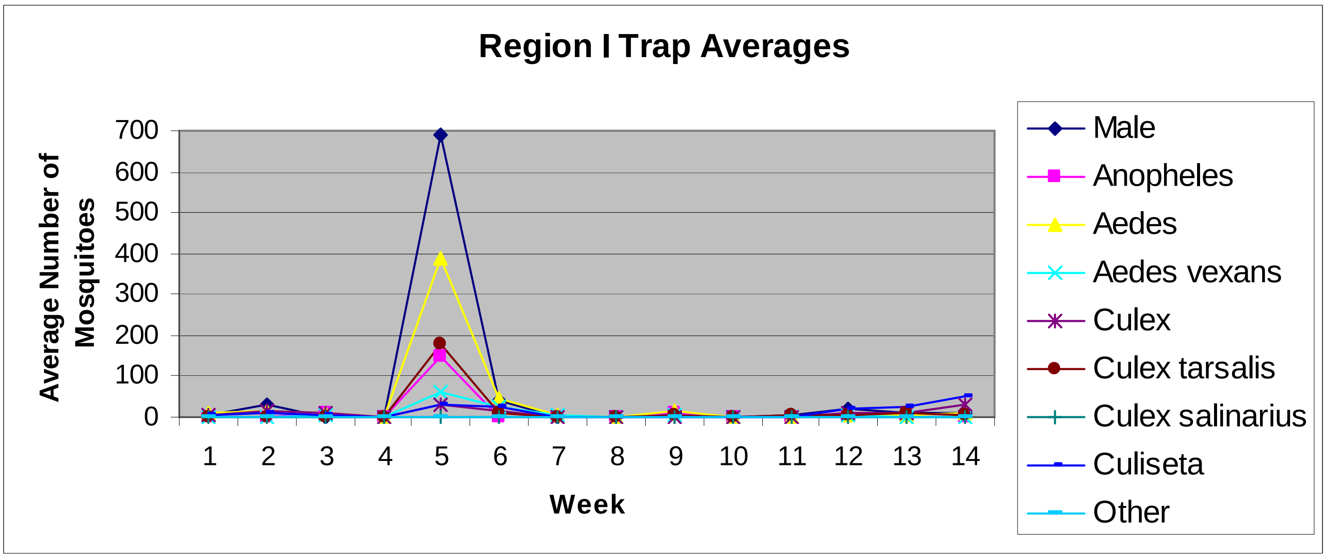
Once hatched, larvae of all species emerge and live in water. After four stages, or instars, the larva molts into a pupa. The pupa stage is a resting, non-feeding stage where the pupa is encased until the adult matures and emerges from the skin after one-and-a-half to four days. Adult male mosquitoes hatch first and live from six to seven days. Female mosquitoes can live for about two weeks, but have been found to survive for up to five months with ample food. Peak adult mosquito populations usually appear within two weeks after a number of eggs hatch.

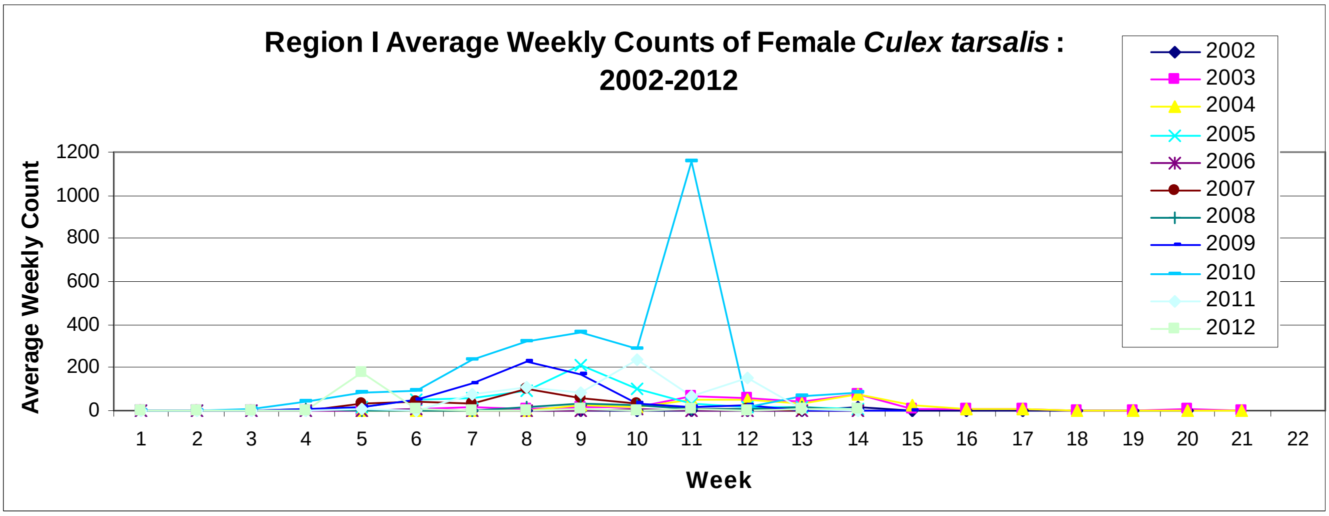
Along with increased rainfall, warmer water temperatures speed up hatching and larval development. If outdoor temperatures are 50 degrees Fahrenheit or higher, productive breeding sites readily produce mosquito larvae. With increasing water temperatures, large mosquito populations can emerge within one week. Research in laboratory settings has shown that if the water temperature exceeds 100 degrees Fahrenheit, it takes only three to four days for larval metamorphosis; if the temperature is 90 degrees Fahrenheit, it takes five days; and a lower water temperature of 70 degrees Fahrenheit decreases rate of growth to 10 days. Floodwater species of *Aedes* larvae generally metamorphose within five to seven days after hatching. The species *Culex tarsalis* completes its life cycle in 14 days at 70 degrees Fahrenheit and in only 10 days at 80 degrees Fahrenheit. On the other hand, some species have naturally adapted to go through their entire life cycle in as little as four days or as long as one month.

When a mosquito becomes an adult, the weather elements affect its peak activity. Most mosquitoes are active from dusk until dawn when wind speeds are less than eight miles per hour, the air temperature is between 65 degrees Fahrenheit and 80 degrees Fahrenheit, and the weather is moderate.

Heavy rains, gusting winds, and cool or high daytime temperatures all limit a mosquito's feeding activity. At temperatures lower than 50 degrees Fahrenheit, mosquitoes become sluggish, reducing their host-seeking behavior. At higher temperatures, usually during daytime hours, adult mosquitoes seek cover in vegetated or humid areas with shade.

Region I
North Dakota Mosquito Surveillance
New Jersey Mosquito Trap Data Analysis





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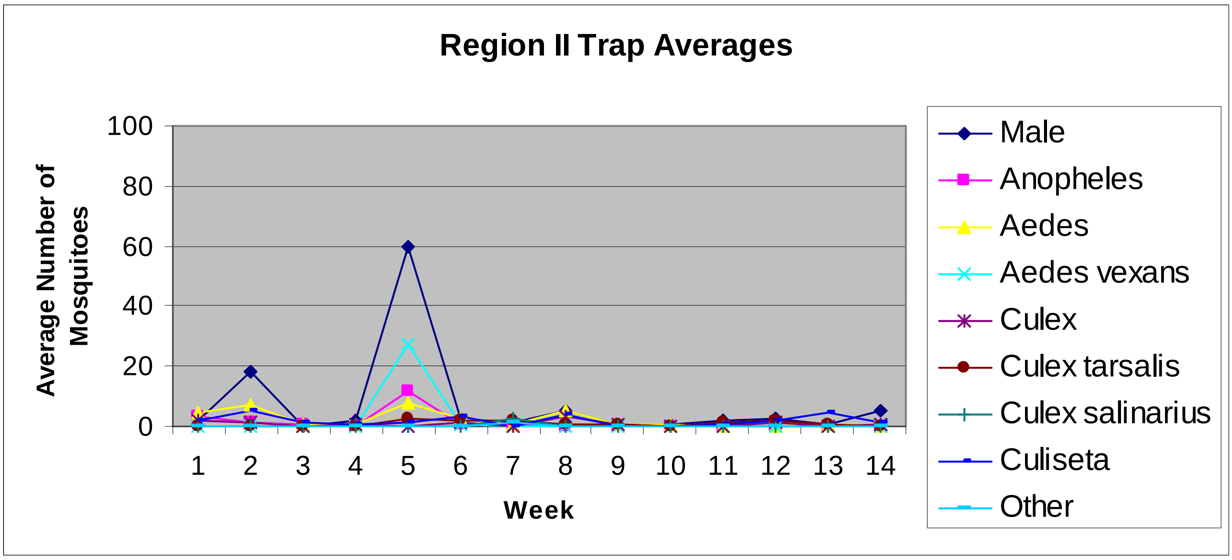

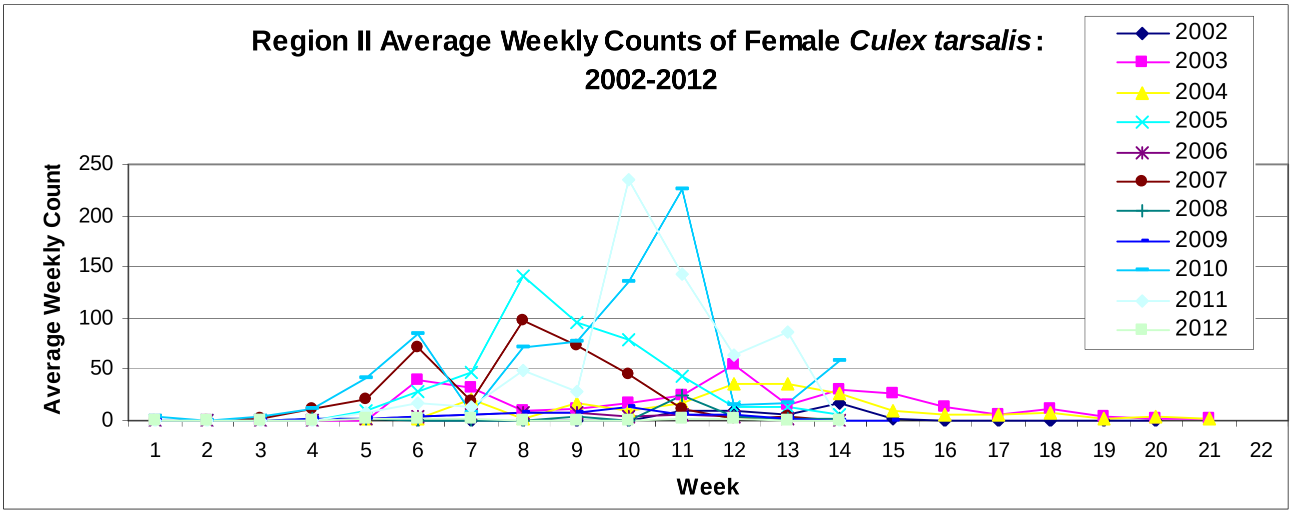

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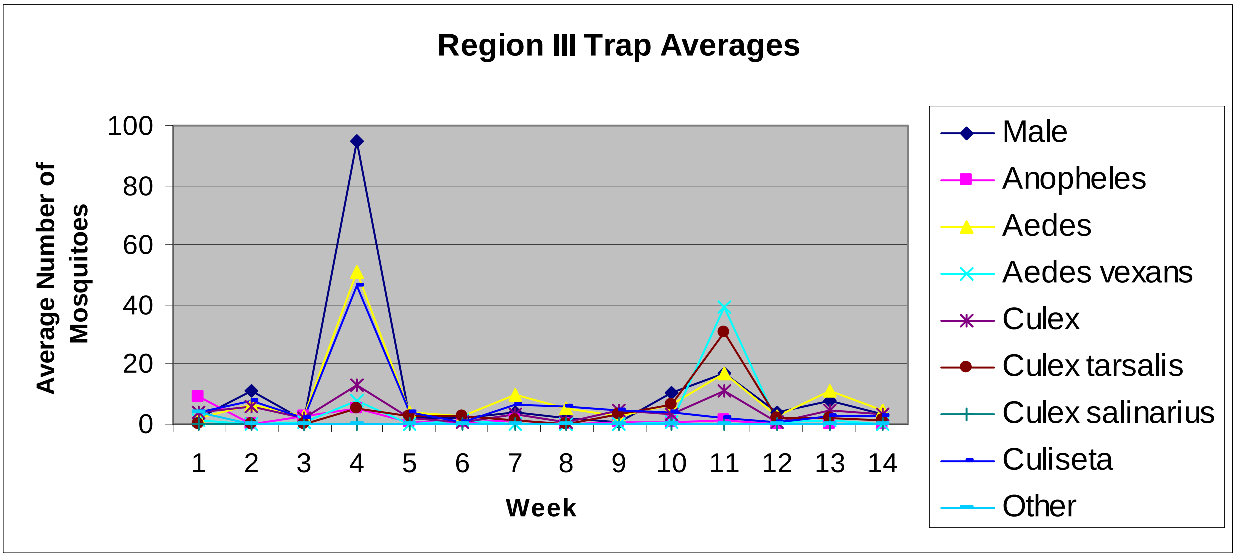
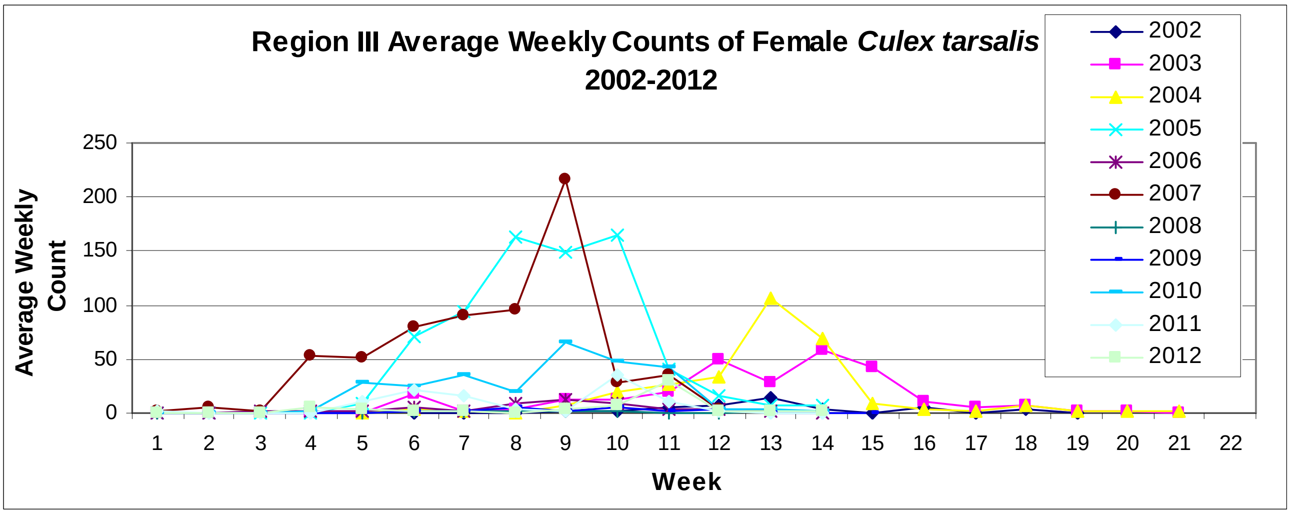
New Jersey Mosquito Trap Data Analysis





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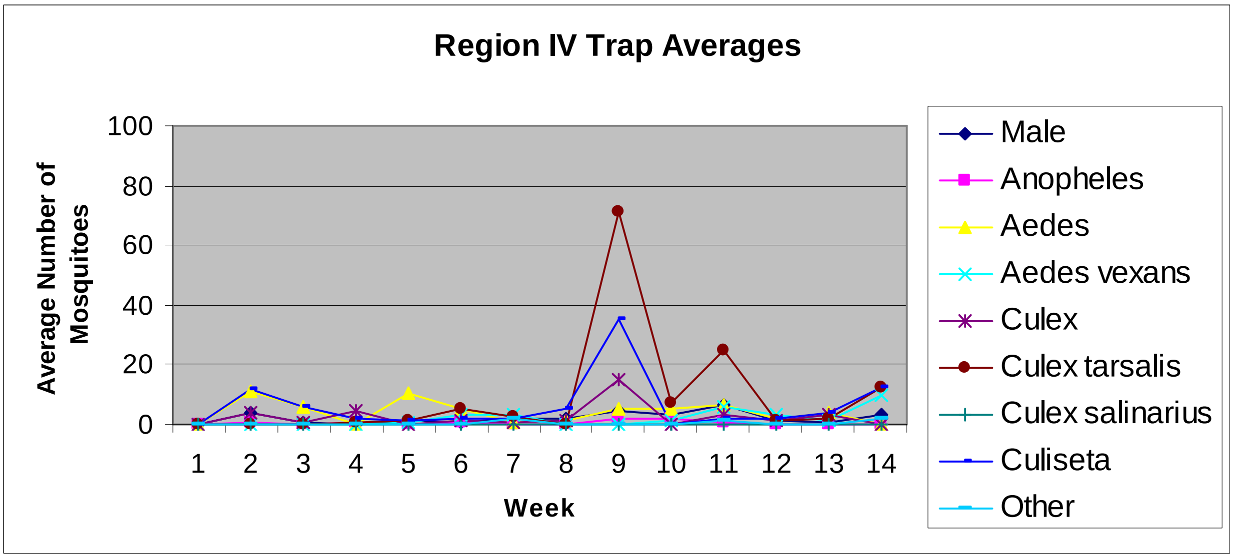
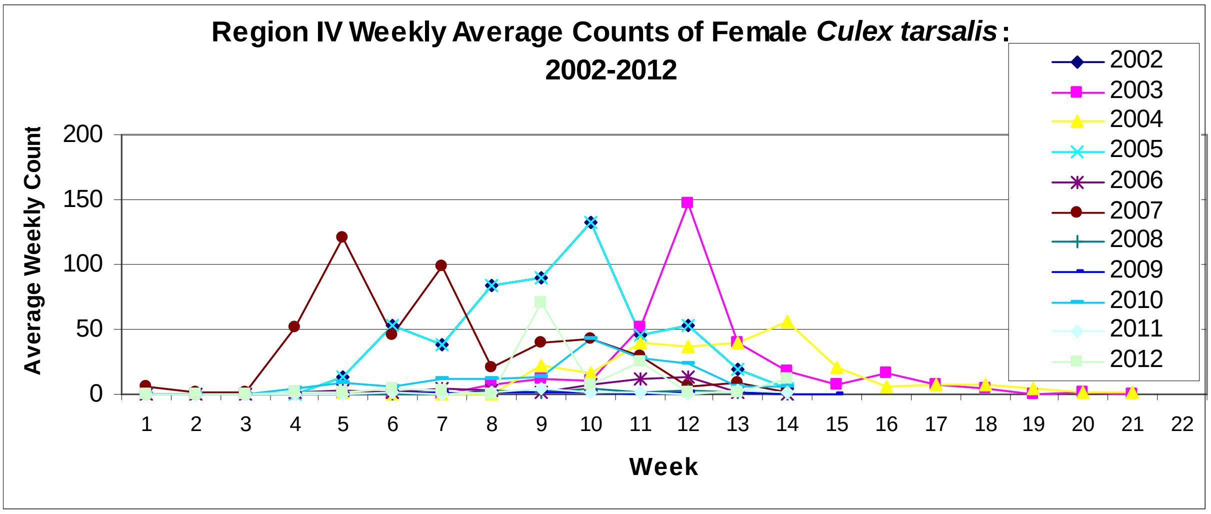
New Jersey Mosquito Trap Analysis





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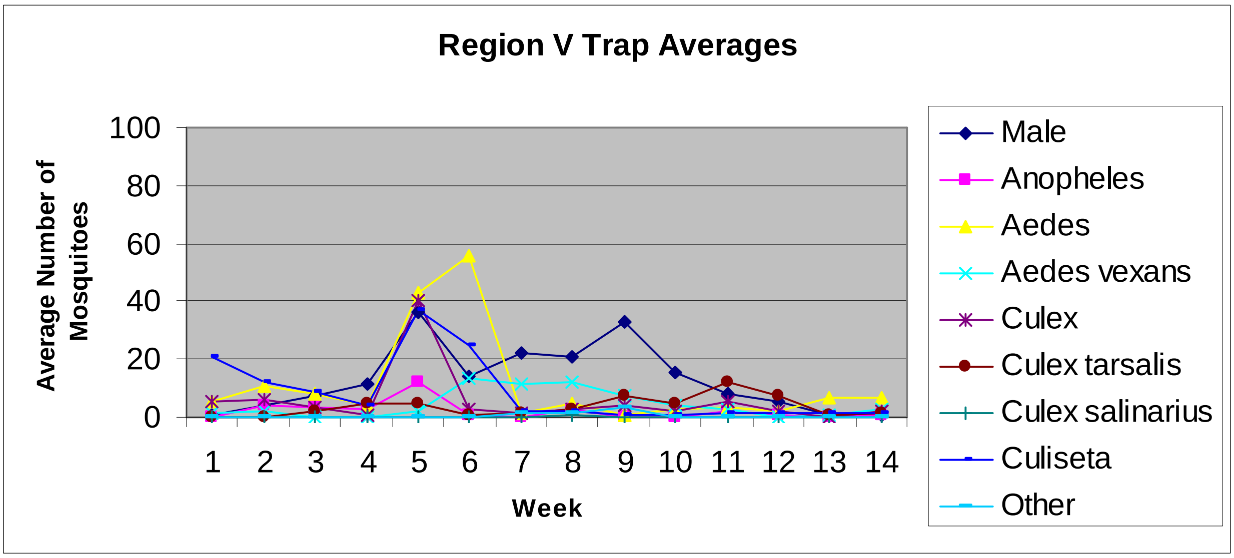

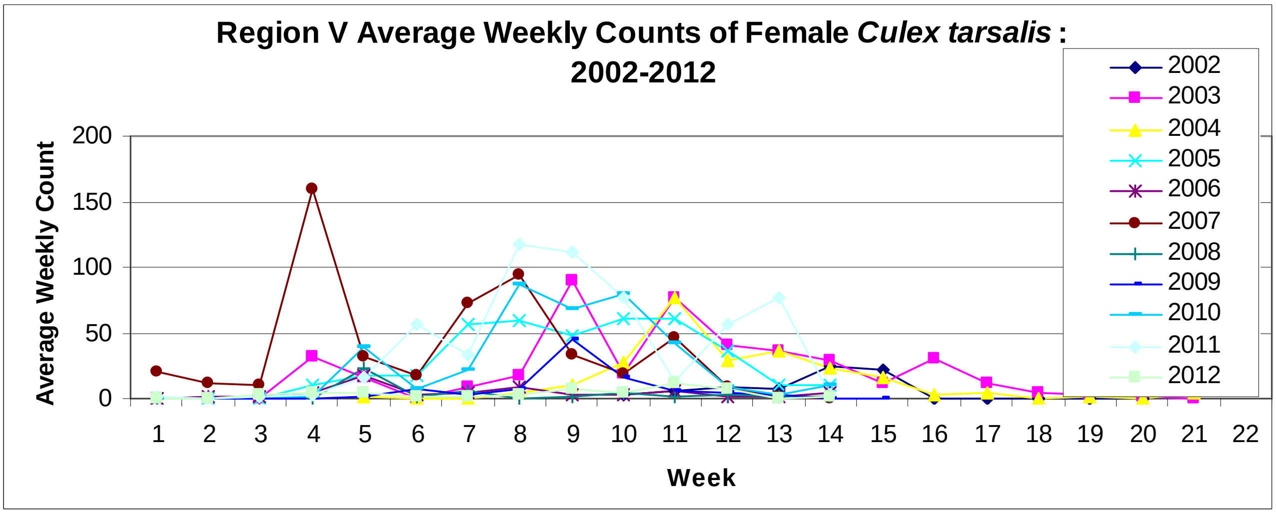

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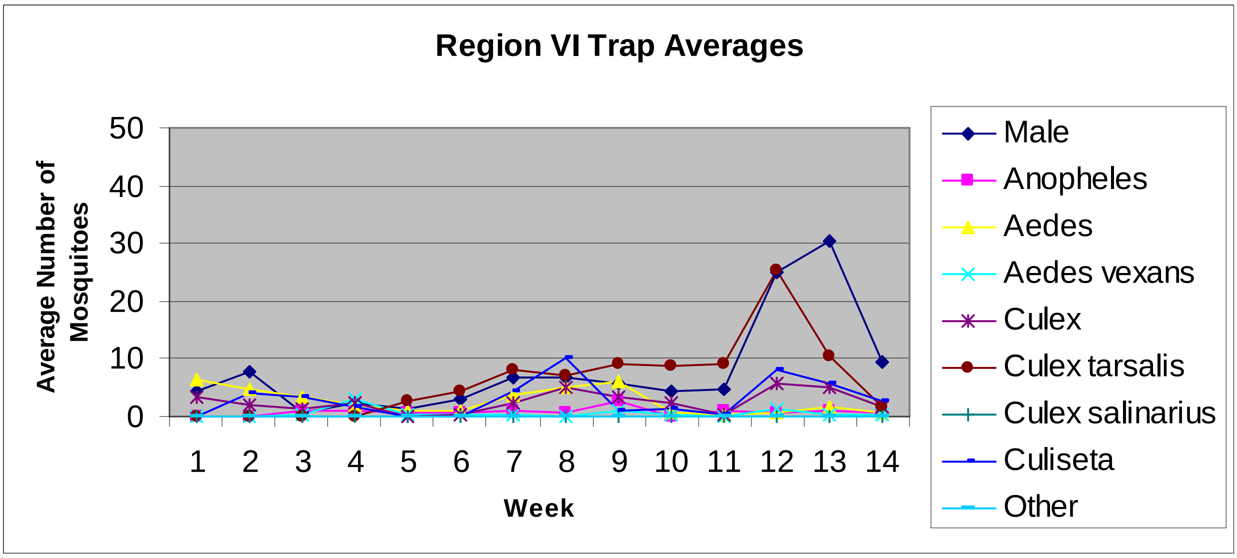
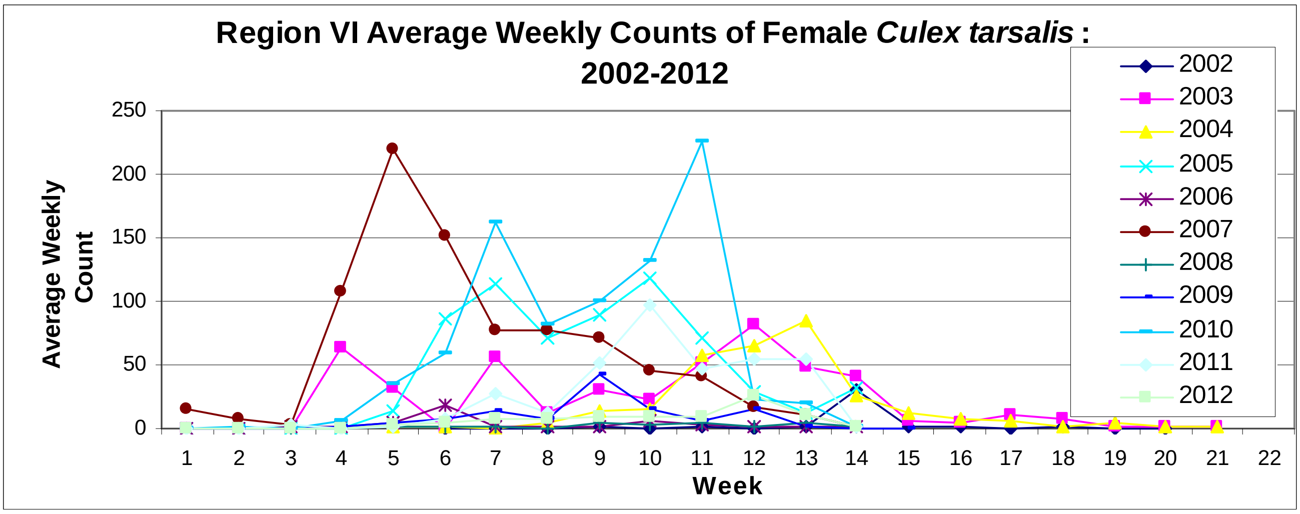
New Jersey Mosquito Trap Data Analysis





Region VII
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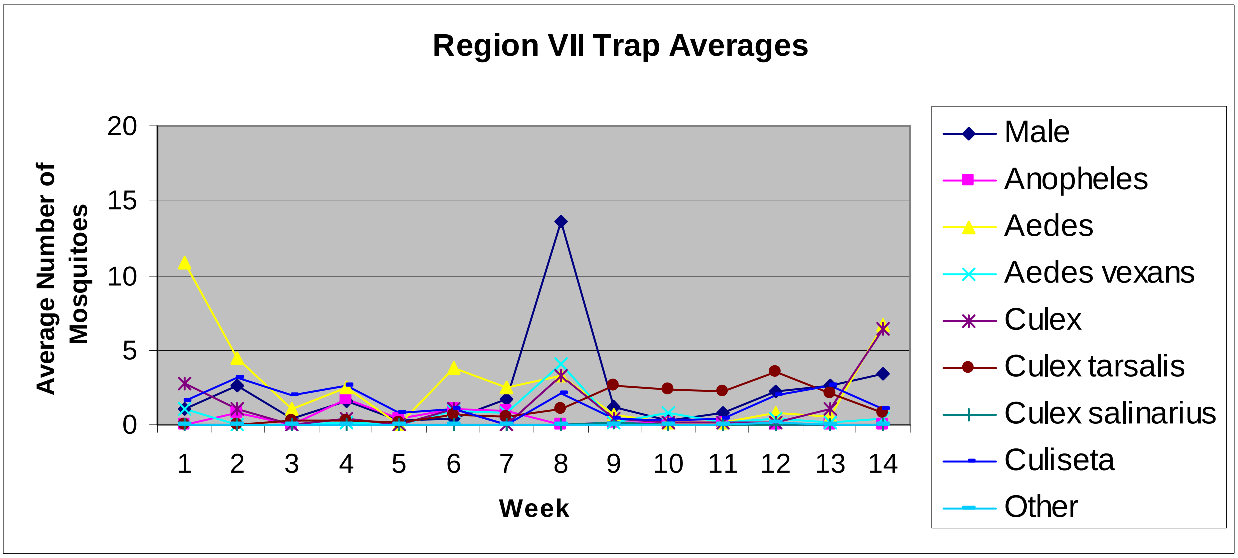
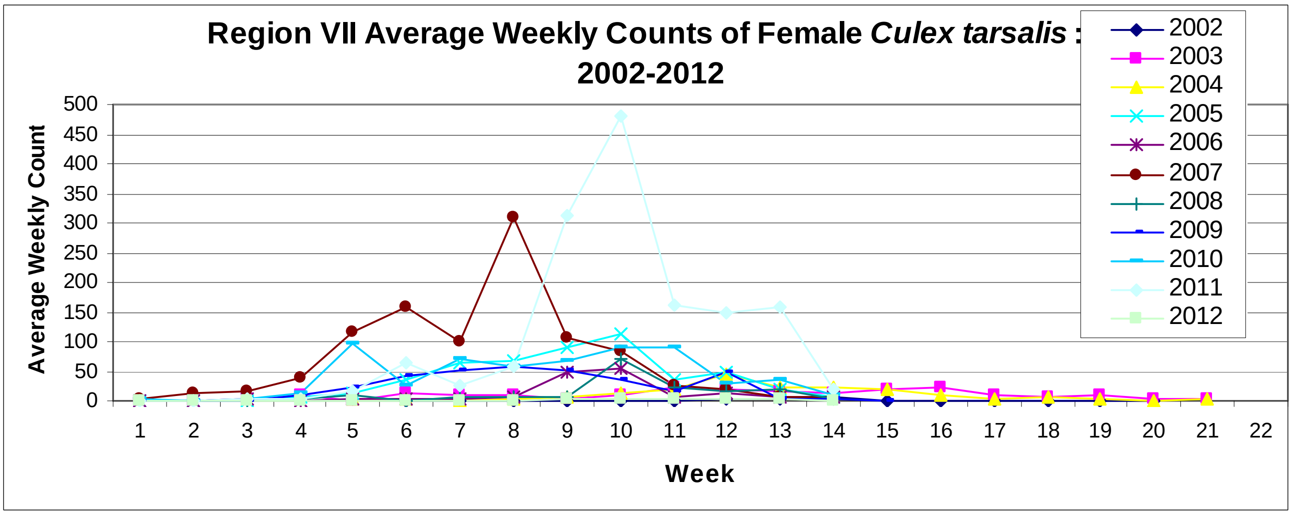
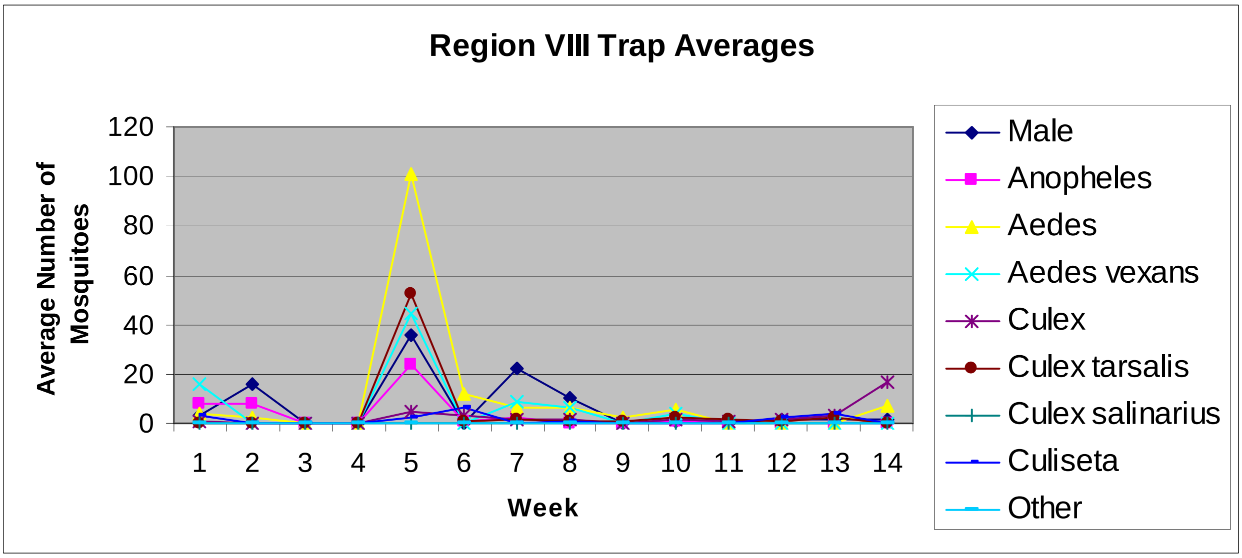
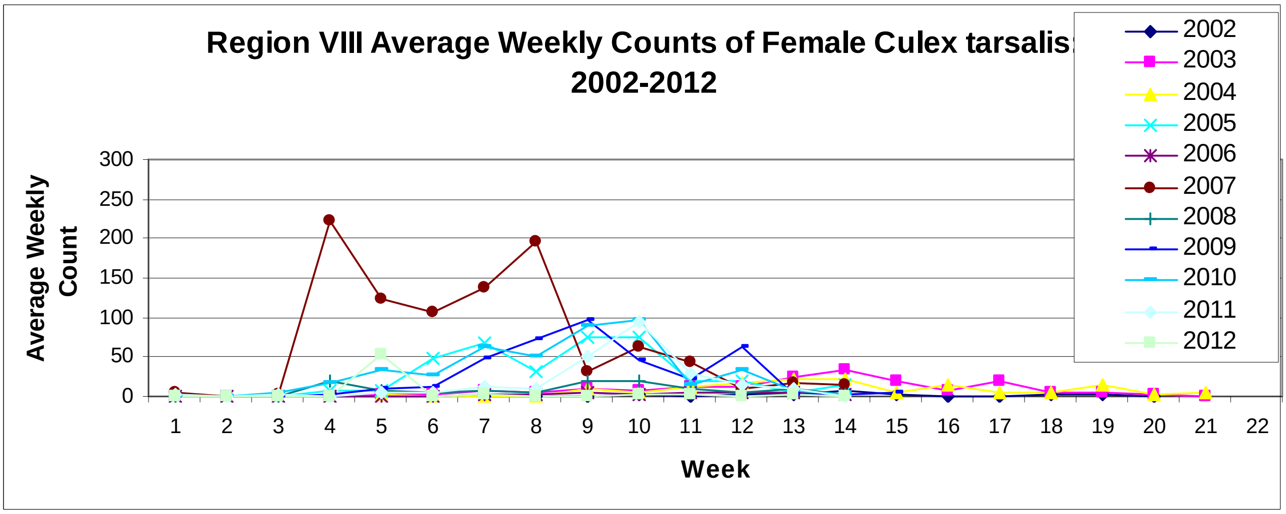


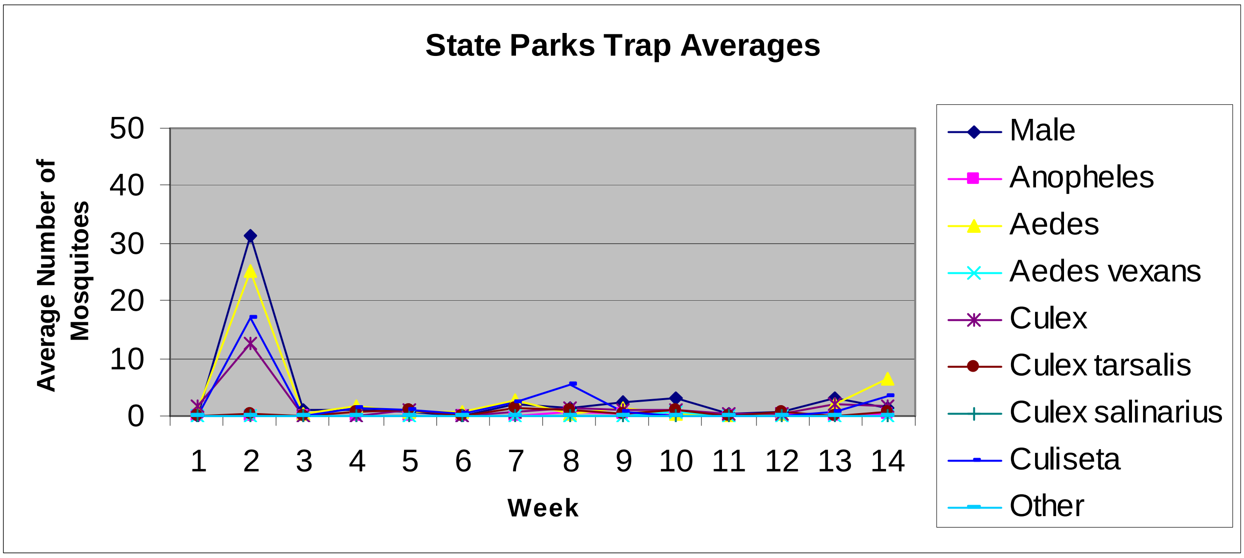


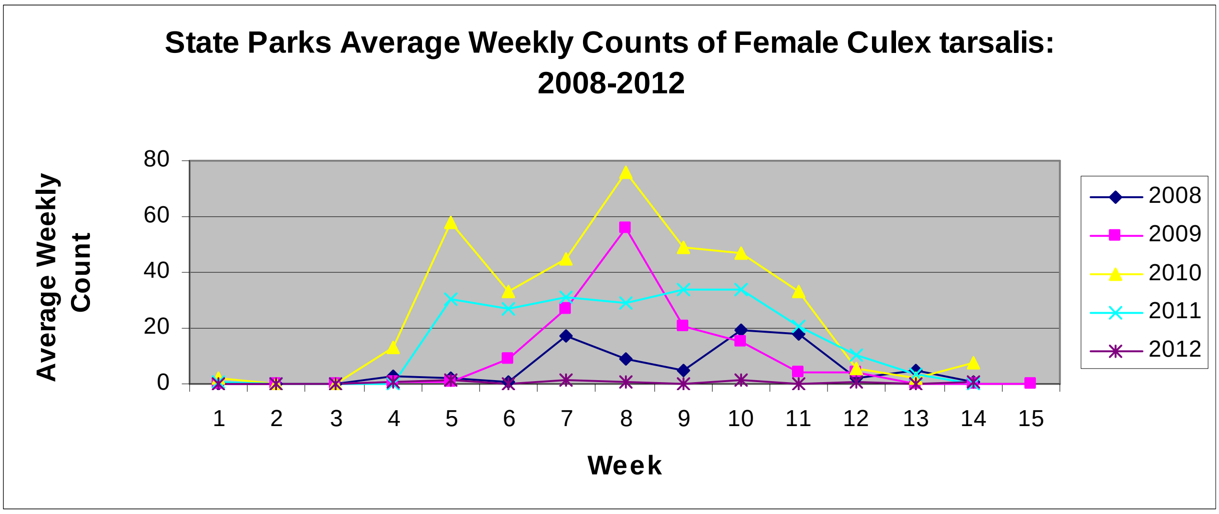
Region VIII
North Dakota Mosquito Surveillance
New Jersey Mosquito Trap Data Analysis



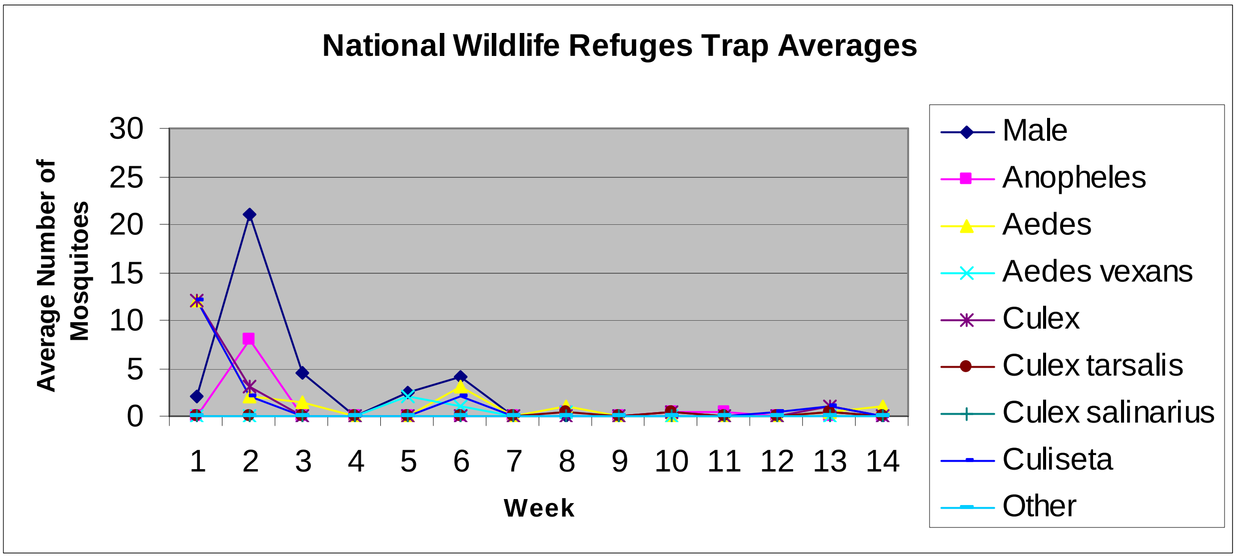


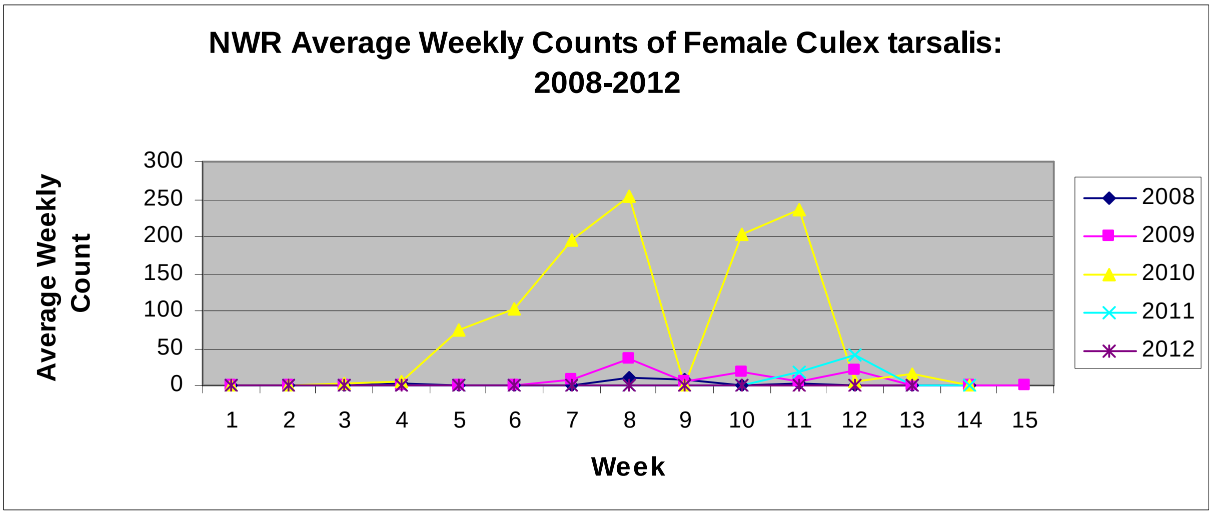
State Parks
North Dakota Mosquito Surveillance
New Jersey Mosquito Trap Data Analysis





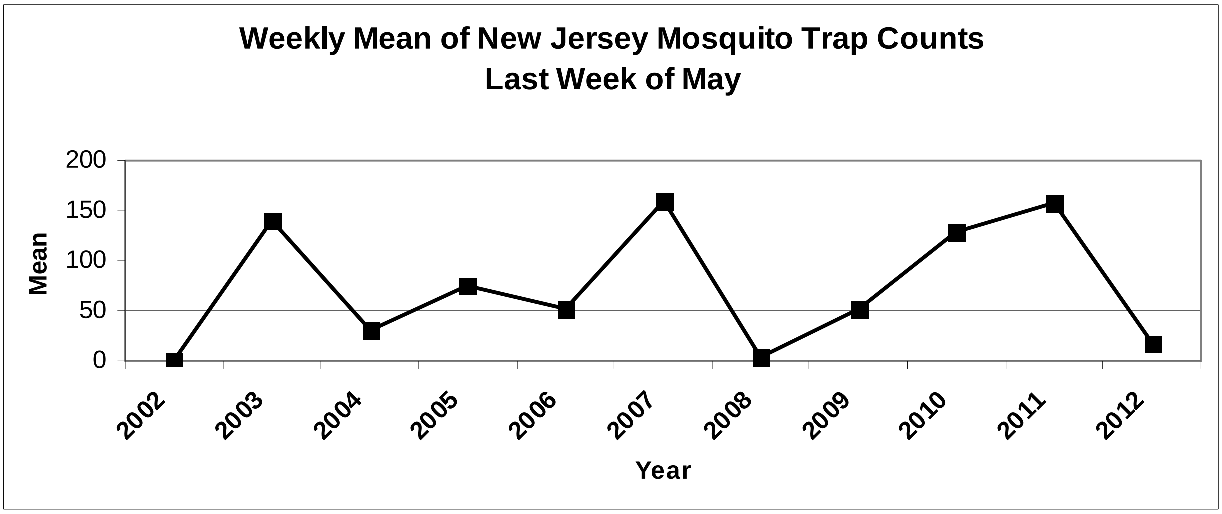
National Wildlife Refuges
North Dakota Mosquito Surveillance
New Jersey Mosquito Trap Data Analysis

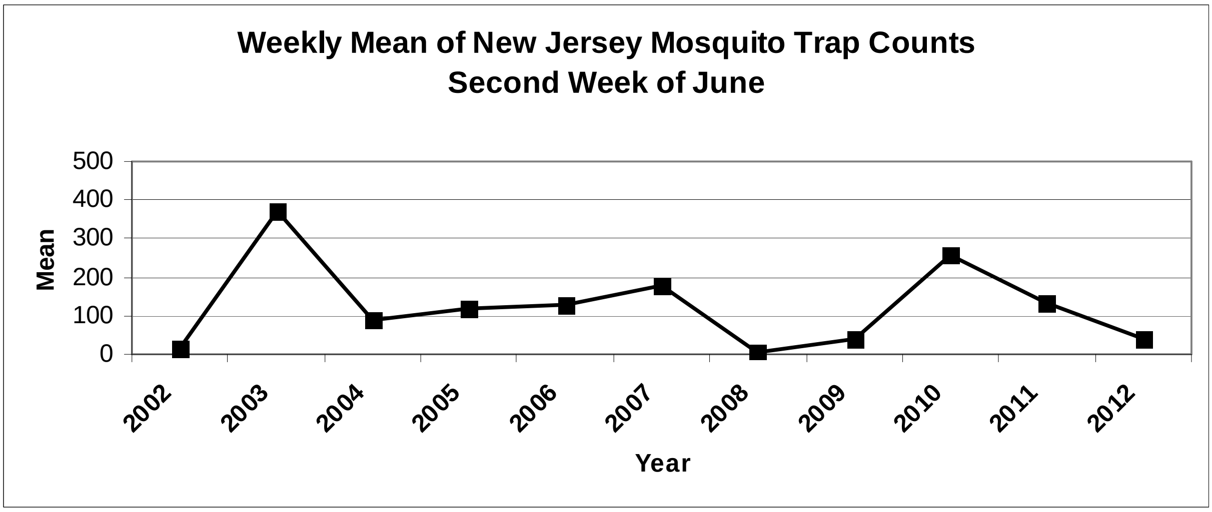


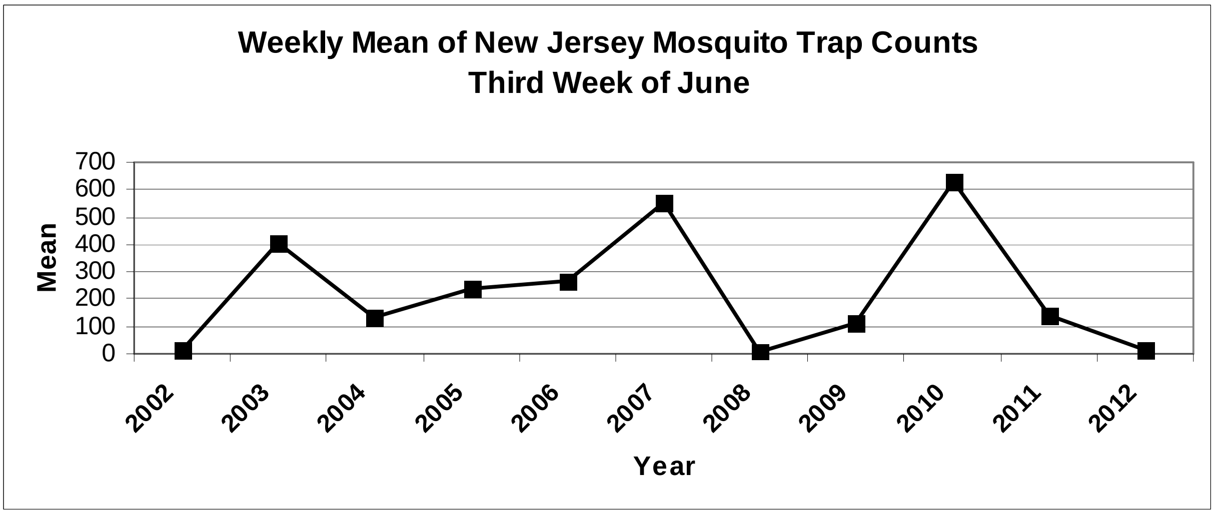


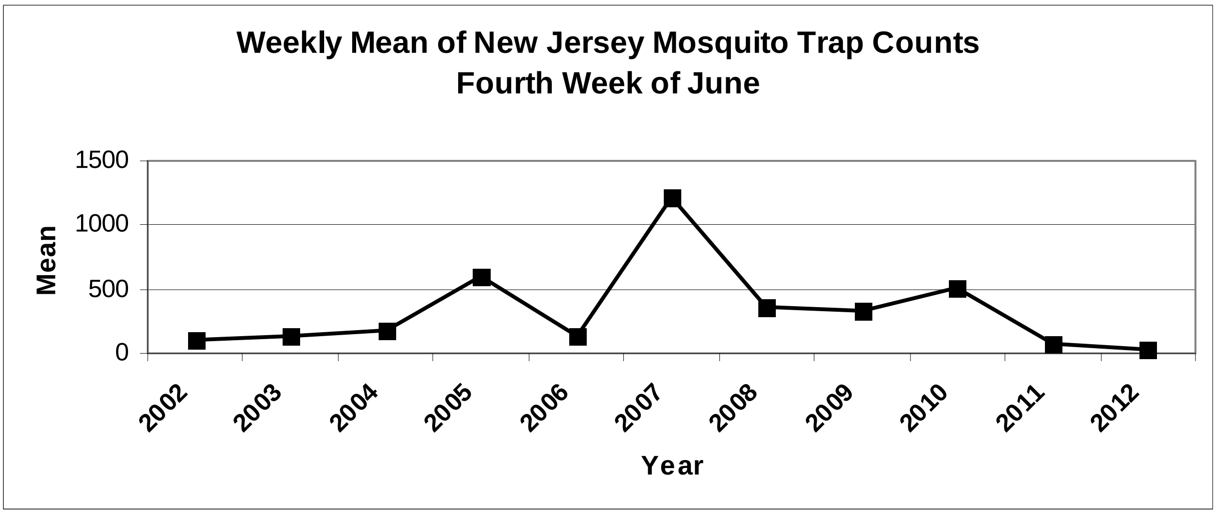
Appendix B 2001-2012
Weekly New Jersey Mosquito Trap Counts Comparison

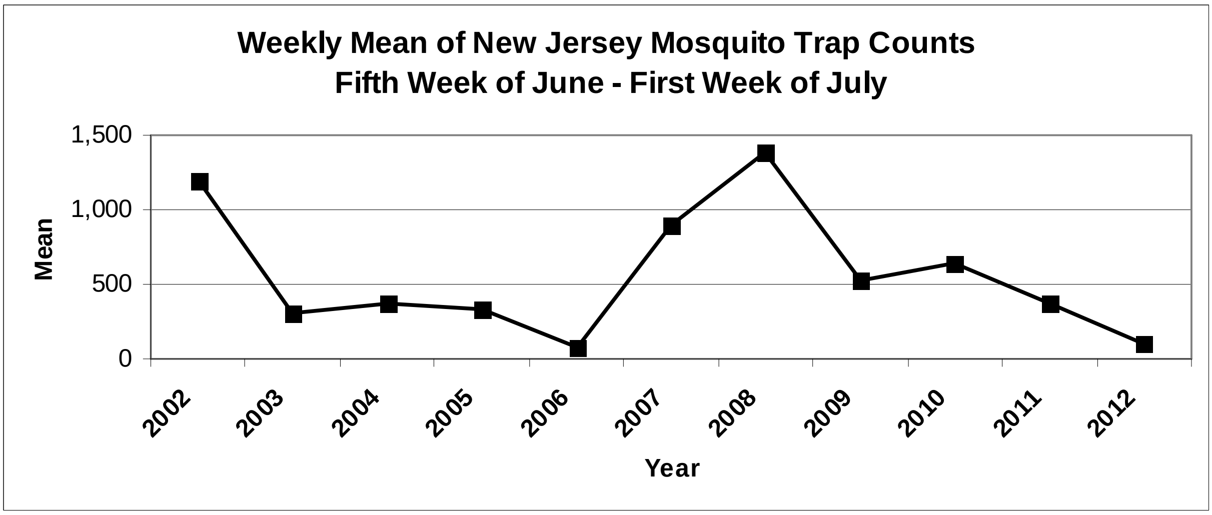
Appendix B includes graphs of the annual trap counts from the last week of May through the first week of September. These graphs depict how the mosquito trap counts have changed between 2001 and 2012. Each year, the general trend of North Dakota's mosquito population is a steady rise in population peaking in early to late July, followed by a gradual decrease through the rest of the mosquito season. Yearly and weekly variances in trap numbers can be attributed to factors such as rainfall, temperature and wind speed.

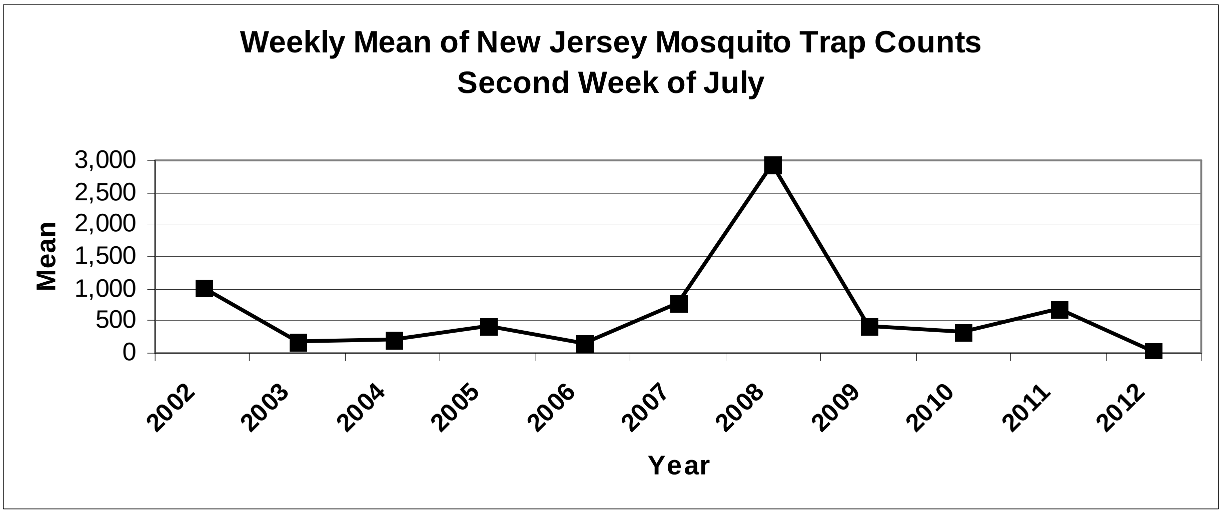


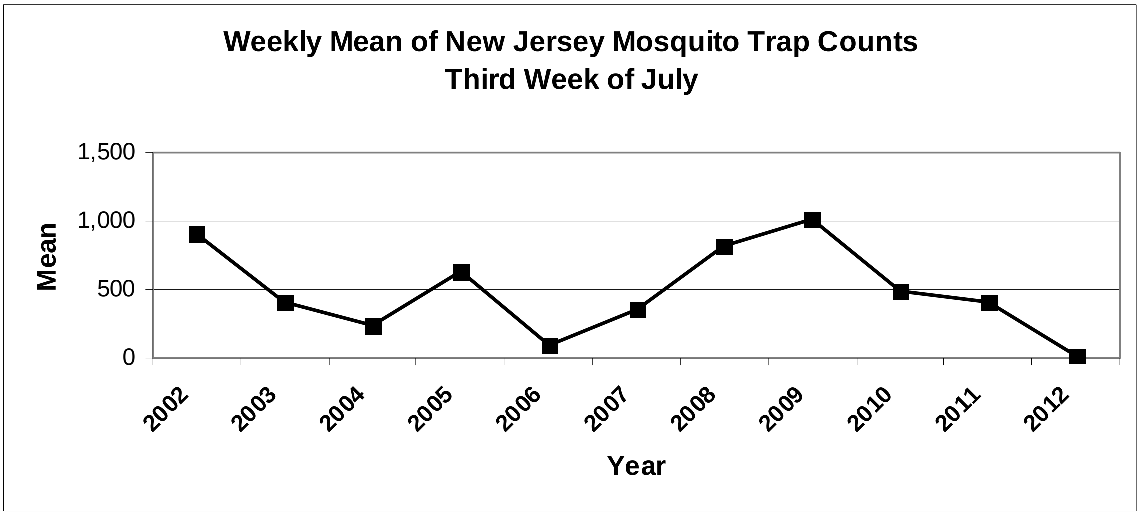

Weekly Mean of New Jersey Mosquito Trap Counts
Second Week of June
500
400
300
200
100
0
Mean
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year

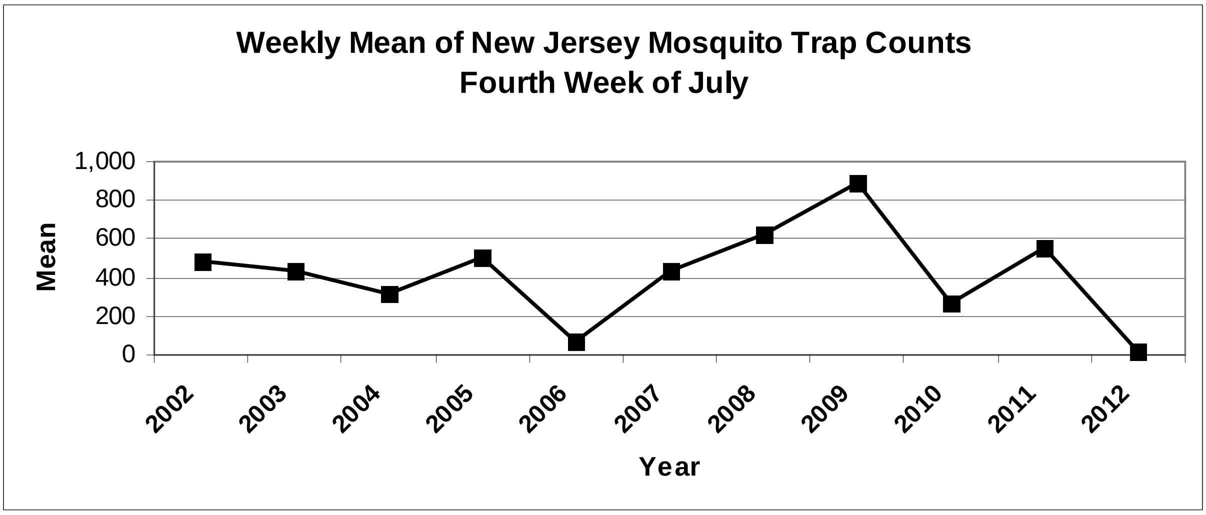

Weekly Mean of New Jersey Mosquito Trap Counts
Third Week of June
700
600
500
400
300
200
100
0
Mean
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year

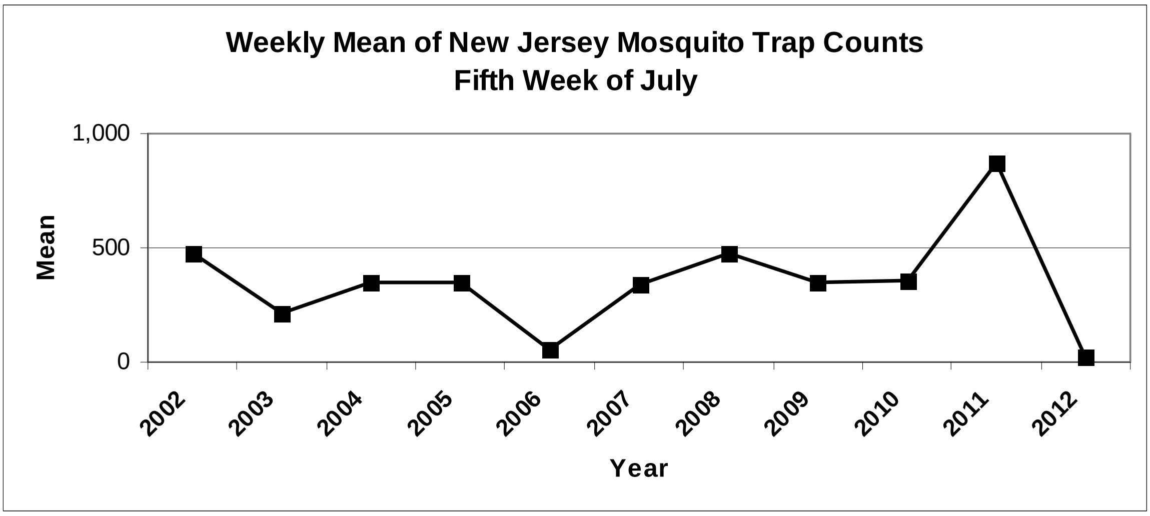

Weekly Mean of New Jersey Mosquito Trap Counts
Fourth Week of June
Mean
1500
1000
500
0
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year

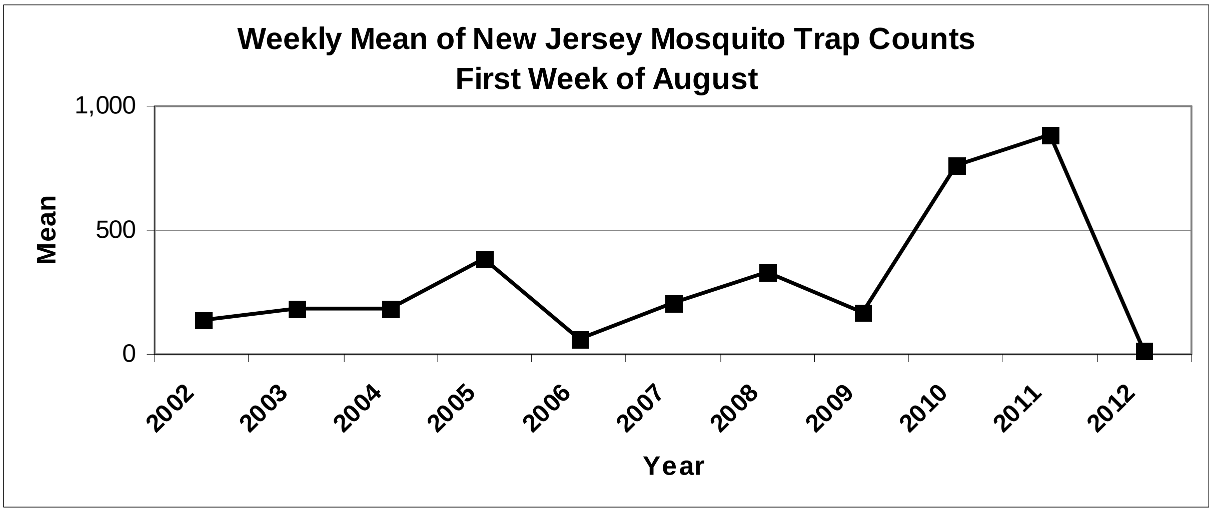

Weekly Mean of New Jersey Mosquito Trap Counts
Fifth Week of June - First Week of July
Mean
1,500
1,000
500
0
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year

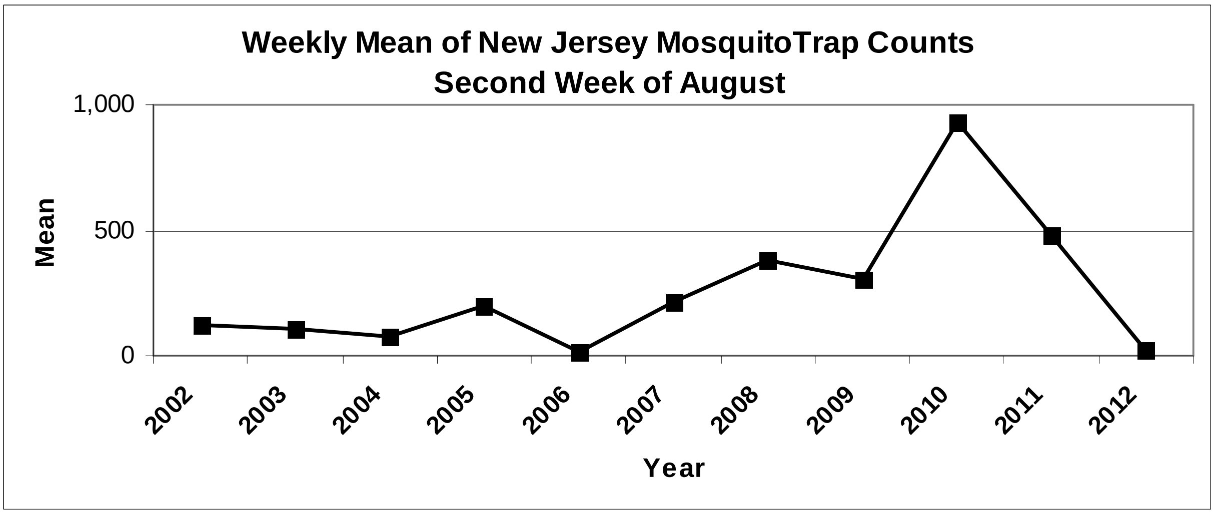

Weekly Mean of New Jersey Mosquito Trap Counts
Second Week of July
Mean
3,000
2,500
2,000
1,500
1,000
500
0
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year

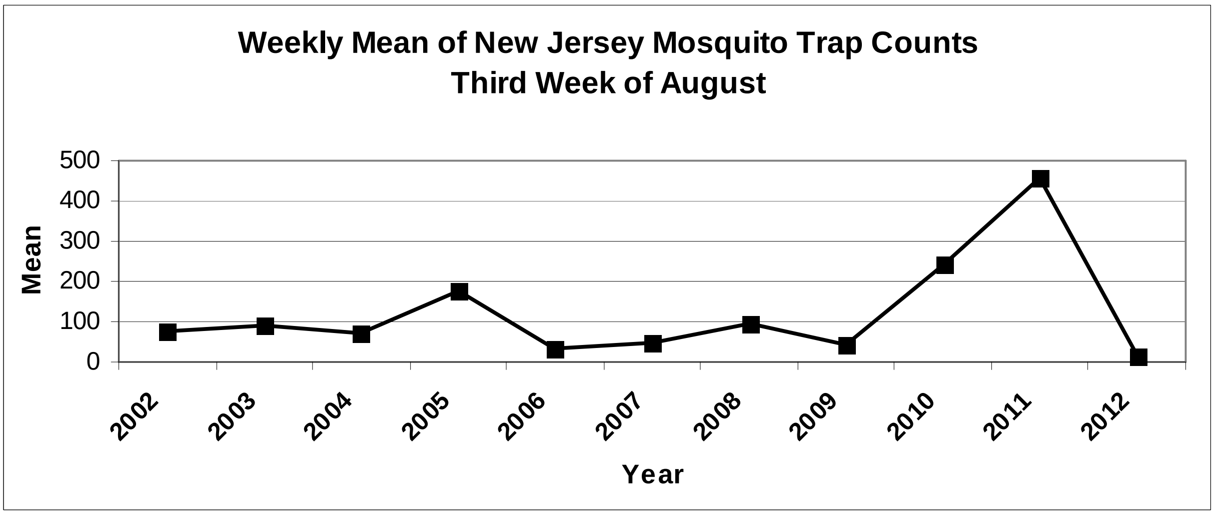

Weekly Mean of New Jersey Mosquito Trap Counts
Third Week of July
Mean
1,500
1,000
500
0
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year

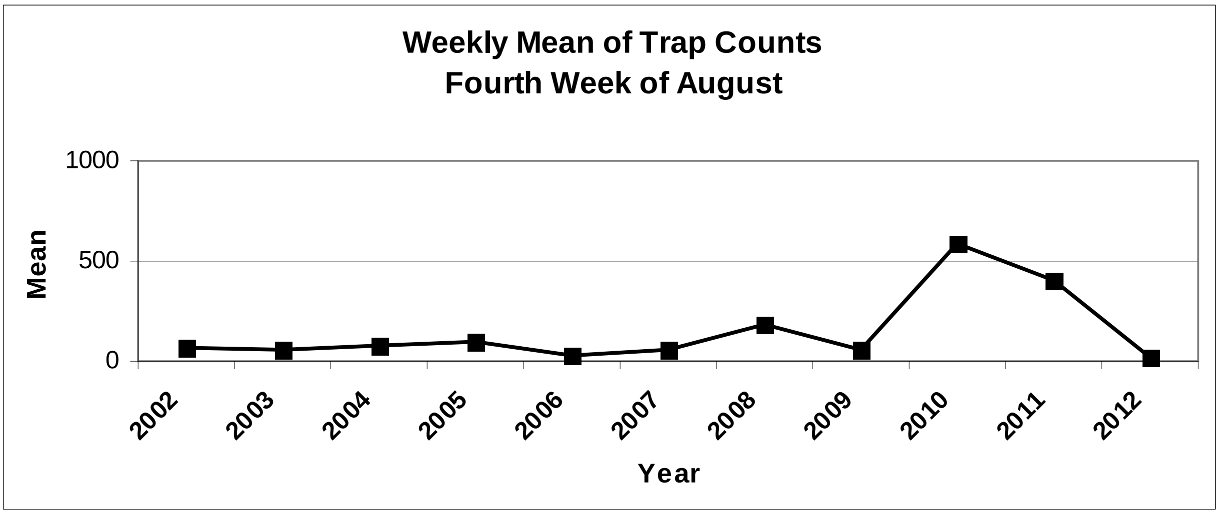

Weekly Mean of New Jersey Mosquito Trap Counts
Fourth Week of July
1,000
800
600
400
200
0
Mean
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year

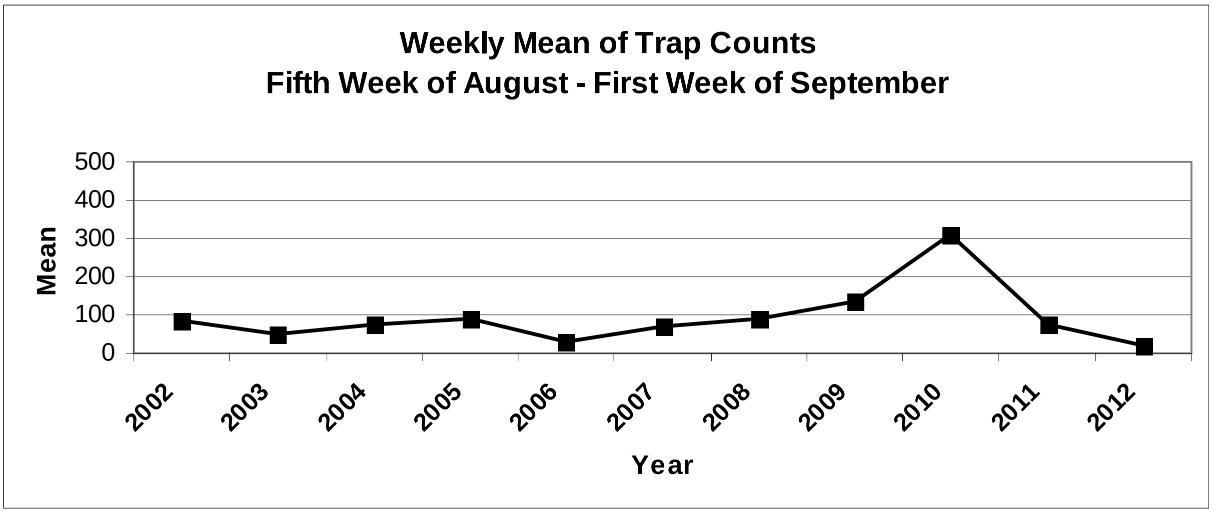

Weekly Mean of New Jersey Mosquito Trap Counts
Fifth Week of July
1,000
500
0
Mean
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year


Weekly Mean of New Jersey Mosquito Trap Counts
First Week of August
1,000
500
0
Mean
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year


Weekly Mean of New Jersey MosquitoTrap Counts
Second Week of August
1,000
500
0
Mean
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year


Weekly Mean of New Jersey Mosquito Trap Counts
Third Week of August
500
400
300
200
100
0
Mean
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year


Weekly Mean of Trap Counts
Fourth Week of August
1000
500
0
Mean
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year


Weekly Mean of Trap Counts
Fifth Week of August - First Week of September
Mean
500
400
300
200
100
0
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Year

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